PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-332064
(43)Date of publication of application : 19.12.1995

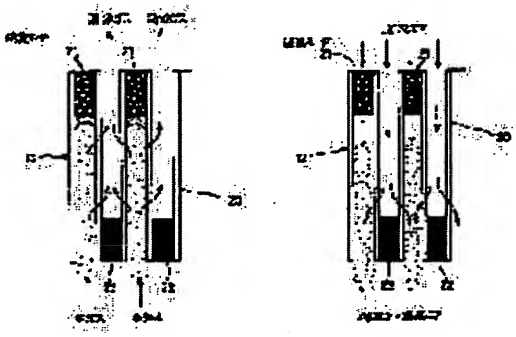
(51)Int.Cl. F01N 3/02
F01N 3/02
B01D 46/42

(21)Application number : 06-128750
(22)Date of filing : 10.06.1994

(71)Applicant : NGK INSULATORS LTD
(72)Inventor : ICHIKAWA YUKIHITO
KASAI YOSHIYUKI
ONO YOSHIRO

(54) EXHAUST GAS FILTER AND EXHAUST GAS PROCESSING EQUIPMENT

(57)Abstract:
PURPOSE: To provide an exhaust gas filter wherein trapping efficiency is excellent, and separation efficiency of particulates is improved at the time of back washing.
CONSTITUTION: In a trapping mode, particulates contained in exhaust gas allowed to flow into an exhaust gas filter 12 are deposited on a bulkhead 20 and just under first seal parts 21. In a back washing air flowing mode, back washing air is injected toward the exhaust gas filter 12 from the exhaust gas downstream side. The back washing air passes the first seal parts 21 and separates particulates deposited just under the first seal parts 21, and also it separates particulates deposited on the bulkhead 20 for forming an exhaust gas flowing hole on which the first seal part 21 is formed, so as to discharge them outside the exhaust gas filter 12. Thereby, pressure loss can be decreased without deteriorating trapping efficiency.



LEGAL STATUS

[Date of request for examination]	19.04.1996
[Date of sending the examiner's decision of rejection]	21.10.1998
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平7－332064

(43)公開日　平成７年(1995)12月19日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｆ０１Ｎ　3/02	３０１　Ｍ			
	ＺＡＢ			
Ｂ０１Ｄ　46/42	ＺＡＢ	Ｃ　9441－4Ｄ		

審査請求　未請求　請求項の数５　ＯＬ　（全７頁）

(21)出願番号　特願平6－128750

(22)出願日　平成６年(1994)６月10日

(71)出願人　000004064
日本碍子株式会社
愛知県名古屋市瑞穂区須田町２番56号

(72)発明者　市川　能邦人
愛知県名古屋市瑞穂区須田町２番56号　日本碍子株式会社内

(72)発明者　笠井　義幸
愛知県名古屋市瑞穂区須田町２番56号　日本碍子株式会社内

(72)発明者　小野　芳則
愛知県名古屋市瑞穂区須田町２番56号　日本碍子株式会社内

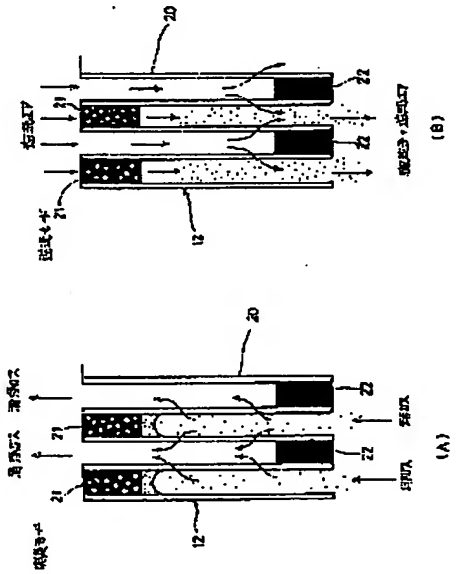
(74)代理人　弁理士　服部　雅紀

(54)【発明の名称】　排ガスフィルタおよび排ガス処理装置

(57)【要約】

【目的】　捕集効率に優れ、逆洗時に微粒子の剥離効率を向上させる排ガスフィルタを提供する。

【構成】　捕集モード時、排ガスフィルタ１２流入した排ガス中に含まれている微粒子は隔壁２０および第１目封じ部２１直下に堆積されていく。逆洗エア流通モード時、排ガス下流側から逆洗エアが排ガスフィルタ１２に向けて噴出される。逆洗エアは、第１目封じ部２１を通過し、第１目封じ部２１直下に堆積している微粒子を剥離するとともに、第１目封じ部２１の形成されている排ガス流通孔を形成する隔壁２０に堆積している微粒子を剥離し排ガスフィルタ１２外に排出する。このため、捕集効率を低下させることなく、圧力損失を低下可能である。



1

【特許請求の範囲】

【請求項1】　隔壁によって区画形成され排ガスの流通する多数のガス流通孔を有するハニカム構造体と、前記ガス流通孔の一部の排ガス下流側の端部を封じる第1封じ部と、前記ガス流通孔の残部の排ガス上流側の端部を封じる第2封じ部とを有する排ガスフィルタであって、前記第1封じ部の細孔が3次元的に追跡し、逆洗エアを流通可能であることを特徴とする排ガスフィルタ。

【請求項2】　前記第1封じ部の空気透過法による空気透過時間は、前記ハニカム構造体の空気透過法による空気透過時間の10～70%であることを特徴とする請求項1記載の排ガスフィルタ。

【請求項3】　前記第1封じ部の目封じ部材深さは、前記隔壁の厚みの10～60倍であることを特徴とする請求項1または2記載の排ガスフィルタ。

【請求項4】　前記第1封じ部の気孔率は前記ハニカム構造体の気孔率の110～140%であることを特徴とする請求項1．2または3記載の排ガスフィルタ。

【請求項5】　請求項1．2、3または4記載の排ガスフィルタに排ガス流れ方向と逆方向から間欠的に逆洗エアを流すことにより前記排ガスフィルタに捕集された排ガス中の微粒子を処理装置に搬送し処理することを特徴とする排ガス処理装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、内燃機関等（以下「内燃機関」をエンジンという）の排ガス中に含まれる炭素を主成分とする微粒子を捕集し、排ガス流れとは逆方向の気流により堆積した微粒子を除去する排ガスフィルタに関するものである。

【0002】

【従来の技術】ディーゼルエンジンの排ガス中には炭素を主成分とする微粒子が高濃度に含まれているため大気汚染等の公害の原因となっている。ディーゼルエンジンの排ガス中に含まれるこのような微粒子を捕集しかつ除去する排ガスフィルタとして、実公昭62－10422号公報等に開示されている排ガスフィルタが各種提案されている。

【0003】実公昭62－10422号公報に示されているものは、排ガスフィルタを構成するハニカム構造体のガス流通孔であるセルを第1セル群と第2セル群とに2分割し、第1セル群の後端開口部を密閉するとともに第2セル群の前端開口部を密閉し、さらに第1セル群を密閉する目封じとしての栓内に排ガスの流通可能な小径の貫通孔を形成している。このような構成の排ガスフィルタでは、排ガス中に含まれる微粒子はガス流通孔を区画形成する薄肉壁に捕集され、排ガス中に含まれる径の大きな不燃成分は第1セル群の栓に設けた貫通孔からフィルタ外部に排出される。このためフィルタ内には燃焼可能な微粒子だけが堆積するので周期的にフィルタを加

2

熱することにより捕集した微粒子を燃焼除去できる。

【0004】

【発明が解決しようとする課題】しかしながら、このような従来の排ガスフィルタでは、貫通孔からフィルタ外部に排出された不燃粒子を捕集する手段が必要となるだけでなく、貫通孔が設けられていても第1セル群の栓直下に堆積物が蓄積されていくとともにフィルタに捕集した微粒子は完全には燃焼除去できないので、フィルタの薄肉壁の目詰まりが拡大していくという問題がある。

【0005】このような問題を解決するため、排ガス流れとは逆向きの逆洗エアを第1セル群に設けられた栓側から間欠的に噴出することにより、第1セル群の貫通孔からエアが噴出しフィルタ内壁に堆積した微粒子または不燃粒子を剥離させ、剥離した堆積物を処理することが考えられる。しかしながら、この処理技術では、逆洗エアによって剥離できるのは貫通孔の真下のごく狭い断面範囲のみであり、大部分の堆積物は剥離できずに残るという問題がある。

【0006】本発明は、このような問題点を解決するためになされたもので、逆洗時の微粒子の剥離効率を向上させることにより、圧力損失を上昇させることなく排ガス中の微粒子の捕集効率の優れた排ガスフィルタおよび排ガス処理装置を提供することを目的とする。

【0007】

【課題を解決するための手段】前記問題点を解決するための本発明の請求項1記載の排ガスフィルタは、隔壁によって区画形成され排ガスの流通する多数のガス流通孔を有するハニカム構造体と、前記ガス流通孔の一部の排ガス下流側の端部を封じる第1封じ部と、前記ガス流通孔の残部の排ガス上流側の端部を封じる第2封じ部とを有する排ガスフィルタであって、前記第1封じ部の細孔が3次元的に追跡し、逆洗エアを流通可能であることを特徴とする。

【0008】また本発明の排ガスフィルタの前記第1封じ部の空気透過法による空気透過時間は、請求項2に記載したように、前記ハニカム構造体の空気透過法による空気透過時間の10～70%であることが捕集効率を維持し、かつ圧力損失を上昇させないので望ましい。さらに本発明の排ガスフィルタの前記第1封じ部の目封じ部材深さは、請求項3に記載したように、前記隔壁の厚みの10～60倍であることが第1封じ部の機械強度を向上させ、かつ圧力損失を上昇させないので望ましい。

【0009】さらにまた本発明の排ガスフィルタの前記第1封じ部の気孔率は、請求項4に記載したように、前記ハニカム構造体の気孔率の110～140%であることが捕集効率を維持し、かつ圧力損失を低減できるので望ましい。さらにまた本発明の排ガスフィルタは、請求項5に記載したように、排ガス流れ方向と逆方向から間欠的に逆洗エアを流すことにより前記排ガスフィルタに捕集された排ガス中の微粒子を処理装置に搬送し処理す

ることを特徴とする排ガス処理装置に使用されることを特徴とする。

【００１０】

【作用および発明の効果】本発明の請求項１、２および４記載の排ガスフィルタによると、ハニカム構造体のガス流通孔の一部の排ガス下流側端部を封じる第１封じ部が逆洗エアを流通可能に形成されている。このため、排ガス下流側から逆洗エアを流すと第１封じ部直下に堆積している微粒子が良好に剥離されるので、隔壁の目詰まりを防止するとともに排ガスフィルタの圧力損失の上昇を防止できる。一方、第１封じ部は気体を流通させるが排ガス中の微粒子は殆ど通過させないので微粒子の捕集効率が悪化することはない。

【００１１】本発明の請求項３記載の排ガスフィルタによると、第１封じ部の目封じ深さを隔壁の厚みの１０～６０倍の範囲内に形成することにより捕集効率を維持し、かつ圧力損失を殆ど上昇させることなく第１封じ部の機械強度を保持できるので目封じ部材の破損を低減できる。ここで目封じ深さとは、第１封じ部の排ガス流れ方向の長さのことである。

【００１２】本発明の請求項５記載の排ガス処理装置によると、請求項１、２、３または４記載の排ガスフィルタに排ガス流れ方向と逆方向から間欠的に逆洗エアを流すことにより排ガスフィルタに捕集された排ガス中の微粒子を排気系外部に搬送するので、逆吹き戻りによる排ガスフィルタの詰まりが防止され、排ガスフィルタの適正な再生が行われ、また排ガス中の微粒子の処理除去効果が大になるという効果がある。また、周囲環境にとって有害な微粒子の大気中への排出量を継続して低減できるという効果がある。

【００１３】

【実施例】以下、本発明の実施例を図面に基づいて説明する。本発明の排ガス処理装置の一実施例を図２および図３に示す。図２に示す排ガス処理装置１０において、通常の排ガス捕集（以下「通常の排ガス捕集」を捕集モードという）時、排ガス管１１から各排ガスフィルタ１２に排ガスが流入する。捕集モード時、各排気バルブ１３は開放状態にあるので、各排ガスフィルタ１２に流入した排ガスは、排ガス中に含まれる炭素を主成分とする微粒子を各排ガスフィルタ１２で捕集され、排ガス処理装置１０から排出される。

【００１４】逆洗再生（以下「逆洗再生」を逆洗エア流通モードという）時、図２の下側の排気バルブ１３のように再生される側の排気バルブ１３を閉じ、再生される側の排ガスフィルタ１２に排ガスが流れないようにし、電磁弁１４を開放し逆洗エアを噴出させることにより排

ガスフィルタ１２の再生を行う。排出された微粒子は捕集タンク１５に搬送される。搬送された微粒子は、図示しない電気ヒータ、バーナー等による燃焼処理や、捕集された微粒子を捕集タンク１５を外して回収する方法等によって処理される。

【００１５】排ガスフィルタ１２はハニカム構造体からなり、図１に示すように、隔壁２０により形成された多数のガス流通孔の一部の排ガス下流側端部は第１目封じ部２１で密閉され、残りのガス流通孔の排ガス上流側端部は第２目封じ部２２で密閉されており、第１目封じ部２１および第２目封じ部２２の他方の端部は開口している。

【００１６】(1) 捕集モード時、図１の（Ａ）に示すように、第２目封じ部２２側から排ガスフィルタ１２に流入する排ガスは、第１目封じ部２１に微粒子を捕集され、隔壁２０を通過して第２目封じ部２２の形成されているガス流通孔から排ガスフィルタ１２外に排出される。

(2) 逆洗エア流通モード時、図１の（Ｂ）に示すように、排ガス下流側から排ガスフィルタ１２に向けて逆洗エアが噴出される。第１目封じ部２１に噴出した逆洗エアは第１目封じ部２１を通過し第１目封じ部２１直下に堆積している微粒子を良好に剥離し、排ガス上流側に吹き飛ばす。第２目封じ部２２の形成されたガス流通孔に噴出した逆洗エアは隔壁２０を通過し、隣接する第１目封じ部２１の形成されたガス流通孔に吹き込み隔壁２０に堆積している微粒子を剥離する。剥離された微粒子は、図２および図３の捕集タンク１５に捕集される。

【００１７】

【表１】

気孔率 (%)	平均細孔径 (μm)	空気逆洗時間 (sec)
45	15	20.5

【００１８】次に、表１に示す特性を有する、直径：１２０mm、長さ：１５０mm、隔壁厚：４３０μm、セル密度：１５．５セル／cm² のハニカム構造体を作成した。ここでセル密度とは、ガス流通孔に垂直な面で排ガスフィルタを切断した場合の単位面積当たりのガス流通孔の数を示す。このガス流通孔の一部の排ガス上流側端部をハニカム構造体と同一材料にて目封じした。そして、残りのガス流通孔の排ガス下流側端部を表２に示す各目封じ部材Ｎｏ．の特性を有する材料で目封じし排ガスフィルタを得た。

【００１９】

【表２】

目封じ部材 No.	気孔率		目封じ部材 平均細孔径 (μm)	空気透過時間	
	(%)	対隔壁比率*1 (%)		(sec)	対隔壁比率*2 (%)
1	40	89	14	37.8	182
2	45	100	15	20.5	100
3	50	111	15	18.0	86
4	50	111	24	14.2	69
5	55	122	15	13.9	68
6	55	122	25	11.1	54
7	55	122	50	6.1	30
8	60	133	15	5.9	29
9	60	133	24	4.7	23
10	60	133	50	2.4	12
11	65	144	15	1.6	8

【００２０】表２において．対隔壁比率*1（％）．対隔壁比率*1（％）はそれぞれ次式で表される。
対隔壁比率*1＝（目封じ部材の気孔率／隔壁部材の気孔率）×１００
対隔壁比率*2＝（目封じ部材の空気透過時間／隔壁部材の空気透過時間）×１００
気孔率は、ＪＩＳ　Ｒ－２２０６に示される測定によって止められ、平均細孔径は水銀圧入法による測定値である。空気透過時間は、図４に示す測定装置３０を用いて測定した。試料４０は図５に示すように試料筒３１にセットされ、周りをシール材４１で密封しリークを防止する。試料４０の上方は大気に開放されている。シール材４１としては．真空グリス．テフロンゴム等を用いることが望ましい。試料４０の厚さｃは４３０μｍ．直径ｄは５㎜とした。ハニカム隔壁試料は壁厚方向を試料厚さ方向となるように、また目封じ部は目封じ深さ方向を試料厚さ方向となるように切り出した。本実施例では、ノズル３１ａのノズル径ｅが０．６㎜の試料筒３１を用いたが．本発明では、試料が厚く空気透過時間が長くなる場合．よりノズル径の大きなものを用いてもよい。

【００２１】次に測定操作について図４および図５に基づいて説明する。図５に示すように．試料４０をセットした試料筒３１を測定装置３０の上端にセットする。下部活栓３２は閉じられている。次に４方活栓３３を操作し貯水ビン３４の水を主管３５および側管３６に導入する。側管上部目盛３６ａの上まで水を導入したら４方活栓３３を操作し水の導入を止める。

【００２２】次に下部活栓３２を開くことにより試料４０の上部から空気が試料４０を通過し．ノズル３１ａを経て空気管３７の先端に形成された空気孔３７ａから測定装置３０内に空気が導入される。測定装置３０内の水は．測定装置３０内の水の上端位置と下部活栓３２との水位差（ａ＋ｂ）により下部活栓３２から流出する。側管３６には目盛がついており、流出した水量を測定することができる。これにより２０ccの水が流出する時間を測定する。２０ccの水が流出する時間は、水面が側管３６の上部目盛３６ａから下部目盛３６ｂへ移動する時間である。ここで求められた時間を空気透過時間とし、ハニカムの隔壁部材および目封じ部材を用いて測定した空気透過時間の比率から対隔壁比率を算出する。また、測定温度は２０℃であった。

【００２３】表２に示す目封じ部材は．表１に示されている特性を有するハニカム構造体の原料に造孔材や発泡材等を加え、気孔率や平均細孔径を変更することにより空気透過時間を変更したものである。造孔材としては、通常用いられるグラファイトや小麦粉等の他に．発泡性のメチルセルロースやポリウレタン等を添加量や粒径を種々変更して用いる。また．目封じ部材としてセラミックファイバーやコージェライト粒子．ＬＡＳ（リチウムアルミノシリケート）系発泡接合材等を使用することもできる。

【００２４】表３に上記のように形成した排ガスフィルタの圧力損失．捕集効率を示す。測定方法として．図２および図３の排ガス処理装置１０を用いて２０００ccのディーゼルエンジンを排ガス発生源とし、排ガス温度４００℃、排ガス中の平均微粒子発生量１７ｇ／Hr．排ガス流量３㎥／分．逆洗エア圧６Kgf／㎠　、逆洗再生間隔５分、逆洗エア噴出時間０．５秒の条件で各種排ガスフィルタ特性の測定を行った。

【００２５】

【表３】

項目	目封じ材 No.	捕集効率 (%)	圧力損失 (mmH2O)	判定
実施例1	4	95.5	1000	良
実施例2	5	96.0	950	良
実施例3	6	95.0	900	良
実施例4	7	93.0	800	良
実施例5	8	94.5	750	良
実施例6	9	93.5	700	良
実施例7	10	92.0	650	良
比較例1	1	97.5	1400	否
比較例2	2	97.0	1300	否
比較例3	3	96.5	1100	否
比較例4	11	88.5	550	否

【００２６】捕集効率は試験開始から３時間までの間に捕集タンク１５に捕集された微粒子の捕集量と発生量の平均捕集時間の比をもって捕集効率とした。また．圧力損失は図２の排ガス管１１における捕集モードでの圧力損失を測定した。排ガスフィルタとしての良否の判定は．捕集効率９０％以上かつ圧力損失１０００mmH2O以

下を良、これ以外を否とした。

【0027】表3に示すように、空気透過時間がハニカム構造体の空気透過時間の10～70%である表2に示す目封じ部材No. 4～10によりそれぞれ形成した実施例1～実施例7の排ガスフィルタは、捕集効率を90%以上に保持したまま圧力損失を低下させている。さらに、空気透過時間がハニカム構造体の空気透過時間の10～30%である実施例4～実施例7は、捕集効率を90%以上に保持したまま圧力損失をさらに低下させているのでより好ましい排ガスフィルタとなっている。一方、比較例1～比較例3の排ガスフィルタのように目封じ部材の空気透過時間がハニカム構造体の空気透過時間の70%を越えると圧力損失が1000mmH$_2$Oを越えるので排ガスの流れ量を低下させてしまう。また比較例4のように、目封じ部材の空気透過時間がハニカム構造体の空気透過時間の10%未満になると圧力損失は低下するものの捕集効率が90%未満に低下するので排ガス中＊

＊の微粒子を十分に捕集することができないという問題がある。

【0028】空気透過時間がハニカム構造体の空気透過時間の10～70%の目封じ部材No. 4～10の気孔率は、表2より、ハニカム構造体の気孔率の110～140%の範囲にあることが判る。気孔率が110%未満になると、平均細孔径を変化させても逆洗エアが目封じ部材をほとんど通過できなくなる。また気孔率が140%を越えると圧力損失は低下するが捕集効率が90%未満になるため十分に排ガス中の微粒子を捕集できない。

【0029】次に、表2に示される目封じ部材No. 2、4、10により目封じ部材の深さを変更して排ガスフィルタを作成し、捕集効率、圧力損失、実験後の目封じ部材の状態を調べた結果を表4に示す。

【0030】

【表4】

項目	目封じ部材No.	目封じ部深さ (mm)	目封じ部深さ 対隔壁比 (倍)	捕集効率 (%)	圧力損失 (mmH$_2$O)	目封じ部材状態	判定
実施例8	4	25	58.1	95.5	1000	◎	良
実施例9	4	13	30.2	95.0	950	◎	良
実施例10	4	12	28.0	95.0	950	○	良
実施例11	4	5	11.6	94.0	900	○	良
実施例12	10	25	58.1	92.0	650	◎	良
実施例13	10	13	30.2	91.5	550	◎	良
実施例14	10	12	28.0	91.5	550	○	良
実施例15	10	5	11.6	90.5	500	○	良
比較例5	2	25	58.1	97.0	1200	◎	否
比較例6	2	13	30.2	96.0	1200	◎	否
比較例7	2	12	28.0	96.0	1200	○	否
比較例8	2	5	11.6	95.5	1150	○	否
比較例9	2	3	7.0	95.0	1150	×～◎	否
比較例10	4	27	62.8	96.0	1050	◎	否
比較例11	4	3	7.0	93.0	900	×	否
比較例12	10	3	7.0	89.5	500	×	否

【0031】表4において、対隔壁比は次式で表される。

対隔壁比＝目封じ深さ／隔壁厚さ

排ガスフィルタとしての良否の判定は、捕集効率90%以上、圧力損失1000mmH$_2$O以下、実験後の目封じ部材の状態が◎または○を可、これ以外を否とした。ここで目封じ部材の状態は、◎：目封じ部材の深さにばらつきのない非常に良好な状態、○：良好な状態、×：目封じ部材の一部に欠損のある状態により表される。

【0032】表4に示すように、目封じ部材の深さがハニカム構造体の隔壁の厚みの10～60倍の範囲内に形成された排ガスフィルタは、捕集効率90%以上、圧力損失1000mmH$_2$O以下、目封じ部材の状態が◎または○の良好な排ガスフィルタであることが判る。また目封じ部材の深さは、ハニカム構造体の隔壁の厚みの30～60倍の範囲内において目封じ部材の深さにばらつきがなく機械強度の観点からも非常に良好であることが判る。空気透過時間がハニカム構造体の空気透過時間の70%を越える目封じ部材を用いた比較例5～比較例8では、目封じ部材深さをハニカム構造体の隔壁の厚みの10～60倍の範囲内に収めても圧力損失が1000mmH$_2$O以下にならない。また、目封じ部材の深さがハニカム構造体の隔壁の厚みの60倍を越えると圧力損失が上昇し、目封じ部材の深さがハニカム構造体の隔壁の厚みの10倍未満になると目封じ部材の機械強度が著しく低下することが判る。

【0033】以上説明した本発明の実施例では、捕集効率が高く、圧力損失の低い材料で排ガス下流側の逆洗エア噴出側の目封じ部だけを形成したが、本発明では、排ガス上流側の目封じ部も同じ材料で形成することは可能である。

【図面の簡単な説明】

【図1】本発明の排ガスフィルタの一実施例を示す模式的断面図である。

【図2】本発明の排ガス処理装置の一実施例を示す模式図である。

【図3】図2のIII 方向矢視図である。

【図4】本発明の排ガスフィルタを試料として空気透過

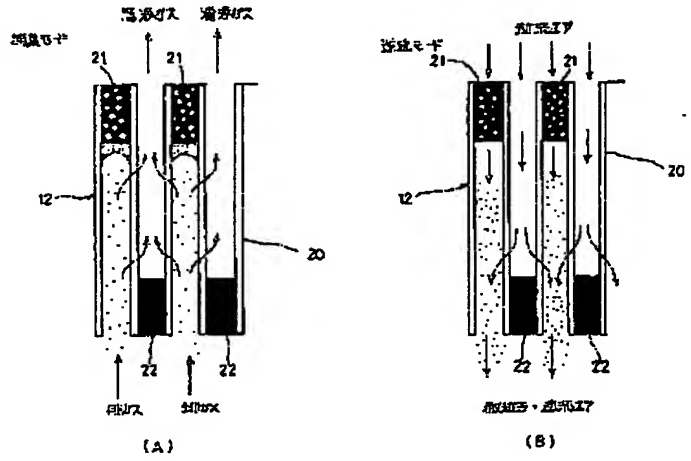
法測定を行った測定装置を示す模式図である。

【図5】図4の空気透過法測定装置の試料筒を示す模式的拡大図である。

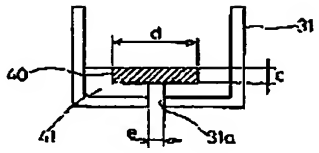
【符号の説明】

10　排ガス処理装置
＊12　排ガスフィルタ
15　捕集タンク（処理装置）
20　隔壁
21　第1目封じ部（第1封じ部）
＊22　第1目封じ部（第2封じ部）

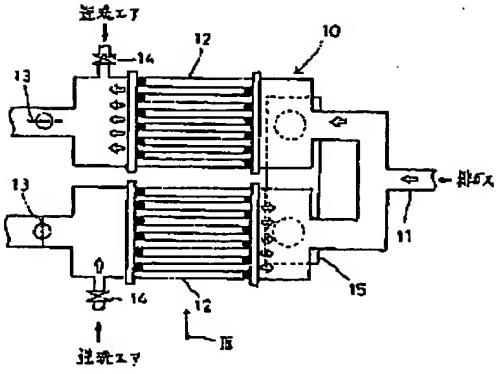
【図1】



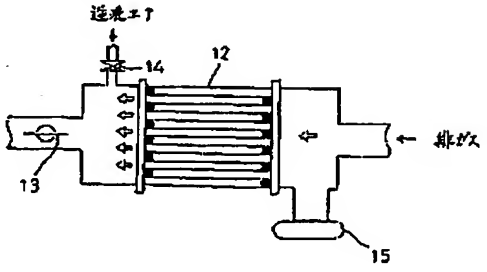
【図5】



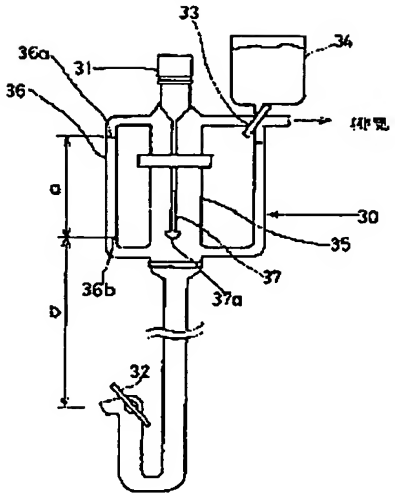
【図2】



【図3】



【図4】



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] the [which stops the edge of the honeycomb structure object which has the gas circulation hole of a large number to which partition formation is carried out and exhaust gas circulates by the septum and a part of exhaust-gas downstream of said gas circulation hole] -- the [which stops one and stops the edge of the exhaust-gas upstream of the section and the remainder of said gas circulation hole] -- the exhaust-gas filter which stops two and has the section -- it is -- the [said] -- the exhaust-gas filter which it stops one, and the pore of the section carries out a chain in three dimension, and is characterized by the ability to be able to circulate back-wash air.
[Claim 2] the [said] -- the exhaust gas filter according to claim 1 characterized by the air transparency time amount stopping and according to the air permeability method of the section being 10 - 70% of the air transparency time amount by the air permeability method of said honeycomb structure object one.
[Claim 3] the [said] -- the exhaust gas filter according to claim 1 or 2 which stops one and is characterized by the ****** member depth of the section being 10 to 60 times the thickness of said septum.
[Claim 4] the [said] -- the exhaust gas filter according to claim 1, 2, or 3 which stops one and is characterized by the porosity of the section being 110 - 140% of porosity of said honeycomb structure object.
[Claim 5] Offgas treatment equipment characterized by conveying and processing to a processor the particle in the exhaust gas by which uptake was carried out to said exhaust gas filter by passing back wash air intermittently from an exhaust gas flow direction and hard flow in an exhaust gas filter according to claim 1, 2, 3, or 4.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention carries out uptake of the particle which uses as a principal component the carbon contained in exhaust gas (an "internal combustion engine" is called engine below), such as an internal combustion engine, and exhaust gas flow is related with the exhaust gas filter from which the particle deposited according to the air current of hard flow is removed.
[0002]
[Description of the Prior Art] Since the particle which uses carbon as a principal component into the exhaust gas of a diesel power plant is contained in high concentration, it is the cause of public nuisances, such as air pollution. It considers as the exhaust gas filter from which uptake of such a particle contained in the exhaust gas of a diesel power plant is carried out, and it is removed, and the various proposals of the exhaust gas filter currently indicated by JP,62-10422,Y etc. are made.
[0003] What is shown in JP,62-10422,Y forms the through tube of the minor diameter which can circulate exhaust gas in the plug as ****** which divides into two the cel which is the gas circulation hole of the honeycomb structure object which constitutes an exhaust gas filter at the 1st cel group and the 2nd cel group, seals front end opening of the 2nd cel group while sealing back end opening of the 1st cel group, and seals the 1st cel group further. With such an exhaust gas filter of a configuration, uptake of the particle contained in exhaust gas is carried out to the thin wall which carries out partition formation of the gas circulation hole, and the big nonflammable component of the path contained in exhaust gas is discharged by the filter exterior from the through tube prepared in the plug of the 1st cel group. For this reason, since only the particle which can burn accumulates in a filter, the combustion removal of the particle which carried out uptake can be carried out by heating a filter periodically.
[0004]
[Problem(s) to be Solved by the Invention] However, since the means which carries out uptake of the nonflammable particle discharged by the filter exterior from the through tube with such a conventional exhaust gas filter is not only needed, but the particle which carried out uptake to the filter cannot carry out combustion removal completely while the deposit is accumulated directly under [plug] the 1st cel group even if the through tube is prepared, there is a problem that the blinding of the thin wall of a filter is expanded.
[0005] It is possible to process the deposit which the particle or nonflammable particle which air blew off from the through tube of the 1st cel group, and was deposited on the filter wall by spouting intermittently from the plug side in which the back wash air of the reverse sense was prepared by the 1st cel group with exhaust gas flow was made to exfoliate in order to solve such a problem, and exfoliated. However, with this processing technique, only the very narrow cross-section range just under a through tube can exfoliate by back wash air, and most deposits have the problem of remaining without the ability exfoliating.
[0006] This invention was made in order to solve such a trouble, and it aims at offering the exhaust gas filter and offgas treatment equipment which were excellent in the collection efficiency of the particle in exhaust gas by raising the exfoliation effectiveness of the particle at the time of a back wash, without raising pressure loss.
[0007]
[Means for Solving the Problem] The exhaust gas filter of this invention for solving said trouble according to claim 1 The honeycomb structure object which has the gas circulation hole of a large number to which partition formation is carried out and exhaust gas circulates by the septum, the [which stops the edge of a part of exhaust gas downstream of said gas circulation hole] -- the [which stops one and stops the edge of the exhaust gas upstream of the section and the remainder of said gas circulation hole] -- the exhaust gas filter which stops two and has the section -- it is -- the [said] -- it stops one, the pore of the section carries out a chain in three dimension, and it is characterized by the ability to circulate back wash air.
[0008] the [moreover, / of the exhaust gas filter of this invention / said] -- since it maintains collection efficiency that it is 10 - 70% of the air transparency time amount by the air permeability method of said honeycomb structure object one as the air transparency time amount stop and according to the air permeability method of the section was indicated to claim 2 and pressure loss is not raised, it is desirable. further -- the [of the exhaust gas filter of this invention / said] -- as it stops one and the ****** member depth of the section was indicated to claim 3, it is 10 to 60 times the thickness of said septum -- the -- since it stops one, and the mechanical strength of the section is raised and pressure loss is not raised, it is desirable.
[0009] further -- again -- the [of the exhaust gas filter of this invention / said] -- since it maintains collection efficiency by stopping one that it is 110 - 140% of the porosity of said honeycomb structure object as the porosity of the section was indicated to claim 4 and pressure loss can be reduced, it is desirable. The exhaust gas filter of this invention is characterized by being used for the offgas treatment equipment characterized by conveying and processing to a processor the particle in the exhaust gas by which uptake was carried out to said exhaust gas filter further again by passing back wash air intermittently from an exhaust gas flow direction and hard flow, as indicated to claim 5.
[0010]
[Function and Effect(s) of the Invention] the [which stops some exhaust gas downstream edges of the gas circulation hole of a honeycomb structure object according to claims 1 and 2 of this invention, and the exhaust gas filter given in four] -- it stops one and the section is formed possible [circulation] in back wash air. for this reason -- if back wash air is passed from the exhaust gas downstream -- the -- since the particle which stopped one and has been deposited directly under the section exfoliates good, while preventing the blinding of a septum, the rise of the pressure loss of an exhaust gas filter can be prevented. on the other hand -- the -- although it stops one and the section circulates a gas, since most particles in exhaust gas do not make it pass, the collection efficiency of a particle does not get worse
[0011] according to the exhaust gas filter of this invention according to claim 3 -- the -- without it maintains collection efficiency and

raises most pressure loss by stopping one and forming the ****** depth of the section within the limits of ten to 60 times of the thickness of a septum -- the -- since it stops one and the mechanical strength of the section can be held, breakage of a ****** member can be reduced. here -- the ****** depth -- the -- it stops one and is the thing of the exhaust gas flow lay length of the section.
[0012] Since the particle in the exhaust gas by which uptake was carried out to the exhaust gas filter by passing back wash air intermittently from an exhaust gas flow direction and hard flow in an exhaust gas filter according to claim 1, 2, 3, or 4 is conveyed to the exhaust air system exterior according to the offgas treatment equipment of this invention according to claim 5 Plugging of the exhaust gas filter by reverse **** return is prevented, and proper playback of an exhaust gas filter is performed, and it is effective in the processing removal effectiveness of the particle in exhaust gas becoming size. Moreover, it is effective in the ability to continue and reduce the discharge to the inside of the atmospheric air of a harmful particle for a perimeter environment.
[0013]
[Example] Hereafter, the example of this invention is explained based on a drawing. One example of the offgas treatment equipment of this invention is shown in drawing 2 and drawing 3 . In the offgas treatment equipment 10 shown in drawing 2 , exhaust gas flows into each exhaust gas filter 12 from an exhaust gas pipe 11 at the time of the usual exhaust gas uptake ("the usual exhaust gas uptake" is called uptake mode below). Since each exhaust air bulb 13 is in an open condition at the time of uptake mode, uptake of the exhaust gas which flowed into each exhaust gas filter 12 is carried out with each exhaust gas filter 12 in the particle which uses as a principal component the carbon contained in exhaust gas, and it is discharged from offgas treatment equipment 10.
[0014] At the time of back wash playback ("back wash playback" is called below back wash air circulation mode), the exhaust air bulb 13 of the side reproduced like the exhaust air bulb 13 of the drawing 2 bottom is closed, and the exhaust gas filter 12 is reproduced by making it exhaust gas not flow in the exhaust gas filter 12 of the side reproduced, opening a solenoid valve 14 wide, and making back wash air blow off. The discharged particle is conveyed by the uptake tank 15. The conveyed particle is processed by the combustion processing by an electric heater, a burner, etc. which are not illustrated, the method of removing the particle by which uptake was carried out and collecting the uptake tanks 15, etc.
[0015] some exhaust gas downstream edges of the gas circulation hole of a large number formed by the septum 20 as the exhaust gas filter 12 consisted of a honeycomb structure object and it was shown in drawing 1 -- the -- it seals by 1 ****** 21 -- having -- the exhaust gas upstream edge of the remaining gas circulation holes -- the -- it seals by 2 ****** 22 -- having -- **** -- the -- the [1 ****** 21 and] -- opening of the other-end section of 2 ****** 22 is carried out.
[0016] (1) it is shown in (A) of drawing 1 at the time of uptake mode -- as -- the -- the exhaust gas which flows into the exhaust gas filter 12 from the 2 ****** 22 side -- the -- uptake of the particle is carried out to 1 ****** 21 -- having -- a septum 20 -- passing -- the -- it is discharged out of the exhaust gas filter 12 from the gas circulation hole with which 2 ****** 22 is formed.
(2) At the time of back wash air circulation mode, as shown in (B) of drawing 1 , back wash air blows off from the exhaust gas downstream towards the exhaust gas filter 12. the -- the back wash air which blew off to 1 ****** 21 -- the -- 1 ****** 21 -- passing -- the -- it exfoliates good and the particle deposited directly under 1 ****** 21 is blown away to the exhaust gas upstream. the -- the [which the back wash air which blew off to the gas circulation hole with which 2 ****** 22 was formed passes a septum 20, and adjoins] -- the particle which blew into the gas circulation hole with which 1 ****** 21 was formed, and has been deposited on a septum 20 is exfoliated. Uptake of the particle which exfoliated is carried out to drawing 2 and the uptake tank 15 of drawing 3 .
[0017]
[Table 1]

気孔率 (%)	平均細孔径 (μm)	空気透過時間 (sec)
45	15	20.5

[0018] Next, diameter:120mm, die-length:150mm, septum thickness which have the property shown in Table 1: 430 micrometers Cel consistency: 15.5 cels / cm2 The honeycomb structure object was created. The number of the gas circulation holes per unit area at the time of cutting an exhaust gas filter in respect of being perpendicular to a gas circulation hole is indicated to be a cel consistency here. Some exhaust gas upstream edges of this gas circulation hole were ******(ed) with the same ingredient as a honeycomb structure object. And it ******(ed) with the ingredient which has the property of each ****** member No. which shows the exhaust gas downstream edge of the remaining gas circulation holes in Table 2, and the exhaust gas filter was obtained.
[0019]
[Table 2]

目封じ部材 No.	気孔率		目封じ部材 平均細孔径 (μm)	空気通過時間	
	(%)	対隔壁比率*1 (%)		(sec)	対隔壁比率*2 (%)
1	40	89	14	37.3	182
2	45	100	15	20.5	100
3	50	111	15	18.0	88
4	50	111	24	14.2	69
5	55	122	15	13.9	68
6	55	122	25	11.1	54
7	55	122	50	6.1	30
8	60	133	15	5.9	29
9	60	133	24	4.7	23
10	60	133	50	2.4	12
11	65	144	15	1.6	8

[0020] In Table 2, pair septum ratio *1(%) pair septum ratio *2(%) is expressed with a degree type, respectively.
Pair septum ratio *1=(porosity of porosity / septum member of ****** member) x100 pair septum ratio *2=(air transparency time amount of air transparency time amount / septum member of ****** member) x100 porosity is JIS. It is stopped by the measurement shown in R-2206, and average pore size is the measured value by the method of mercury penetration. Air transparency time amount was measured using the measuring device 30 shown in drawing 4 . A sample 40 is set to the sample cylinder 31 as shown in drawing 5 , it seals the surroundings by the sealant 41, and prevents leak. The upper part of a sample 40 is wide opened by atmospheric air. As a sealant 41, it is desirable to use vacuum grease, Teflon rubber, etc. Thickness c of a sample 40 is 430 micrometers. The diameter d was set to 5mm. ******** started the ****** depth direction so that it might become the sample thickness direction, so that a

honeycomb septum sample might serve as the sample thickness direction in the direction of wall thickness. Although the diameter e of a nozzle of nozzle 31a used the sample cylinder 31 which is 0.6mm in this example, when it is thick and a sample becomes [air transparency time amount] long, what has a more big diameter of a nozzle may be used by this invention.

[0021] Next, measurement actuation is explained based on drawing 4 and drawing 5 . As shown in drawing 5 , the sample cylinder 31 which set the sample 40 is set to the upper limit of a measuring device 30. The lower stopper cock 32 is closed. Next, the method stopper cock 33 of four is operated, and the water of the storage-of-water bottle 34 is introduced into a main pipe 35 and a by-pass 36. If water is introduced on by-pass up graduation 36a, the method stopper cock 33 of four will be operated, and installation of water will be stopped.

[0022] Next, by opening the lower stopper cock 32, air passes a sample 40 from the upper part of a sample 40, and air is introduced in a measuring device 30 from vent 37a formed at the tip of an air pipe 37 through nozzle 31a. As for the water in a measuring device 30, at least the water of the upper limit location of the water in a measuring device 30 and the lower stopper cock 32 flows out of the lower stopper cock 32 according to a difference (a+b). The graduation is taking lessons from the by-pass 36, and the amount of water which flowed out can be measured. The time amount into which 20 cc water flows by this is measured. The time amount into which 20 cc water flows is time amount which the water surface moves to lower graduation 36b from up graduation 36a of a by-pass 36. Time amount found here is made into air transparency time amount, and the ratio for a septum is computed from the ratio of the air transparency time amount measured using the septum member and ****** member of a honeycomb. Moreover, measurement temperature was 20 degrees C.

[0023] The ****** member shown in Table 2 adds ostomy material, foam, etc. to the raw material of the honeycomb structure object which has the property shown in Table 1, and changes air transparency time amount by changing porosity and average pore size. As ostomy material, various additions and particle size are changed else [, such as graphite usually used and wheat flour,], and methyl cellulose, polyurethane, etc. of fizz are used. Moreover, ceramic fiber, a cordierite particle, a LAS (lithium aluminosilicate) system foaming jointing material for corrugated fibreboard, etc. can also be used as a ****** member.

[0024] The pressure loss of the exhaust gas filter formed in Table 3 as mentioned above and collection efficiency are shown. The 2000 cc diesel power plant was made into the exhaust gas generation source, using drawing 2 and the offgas treatment equipment 10 of drawing 3 as a measuring method, and various exhaust gas filter shapes were measured for a part for /Hr and amount of emission of 3m 3/, 6 Kgf/cm back wash air ** 2, and back wash playback spacing 5 minutes on the conditions for back wash air jet time amount 0.5 seconds the exhaust gas temperature of 400 degrees C, and the average particle yield of 17g in exhaust gas.

[0025]

[Table 3]

項目	目封じ部材 No.	捕集効率 (%)	圧力損失 (mmH_2O)	判定
実施例1	4	95.5	1000	良
実施例2	5	96.0	950	良
実施例3	6	95.0	900	良
実施例4	7	93.0	800	良
実施例5	8	94.5	750	良
実施例6	9	93.5	700	良
実施例7	10	92.0	650	良
比較例1	1	97.5	1400	否
比較例2	2	97.0	1300	否
比較例3	3	96.5	1100	否
比較例4	11	88.5	550	否

[0026] Collection efficiency was made into collection efficiency with the ratio of the average uptake time amount of the amount of uptake and yield of a particle by which uptake was carried out to the uptake tank 15 from test initiation before 3 hours. Moreover, pressure loss measured the pressure loss in the uptake mode in the exhaust gas pipe 11 of drawing 2 . The judgment of the quality as an exhaust gas filter is 90% or more of collection efficiency, and pressure loss 1000mmH2O. The following was made into good and except [this] was made into no.

[0027] As shown in Table 3, the exhaust gas filter of the example 1 formed, respectively by ****** member No.4-10 shown in Table 2 whose air transparency time amount is 10 - 70% of the air transparency time amount of a honeycomb structure object - an example 7 is reducing pressure loss, holding collection efficiency to 90% or more. Furthermore, since the example 4 whose air transparency time amount is 10 - 30% of the air transparency time amount of a honeycomb structure object - the example 7 are reducing pressure loss further, holding collection efficiency to 90% or more, they serve as a more desirable exhaust gas filter. On the other hand, if the air transparency time amount of a ****** member exceeds 70% of the air transparency time amount of a honeycomb structure object like the exhaust gas filter of the example 1 of a comparison - the example 3 of a comparison, pressure loss is 1000mmH(s)2O. Since it exceeds, the amount of flow of exhaust gas will be reduced. Moreover, like the example 4 of a comparison, when the air transparency time amount of a ****** member turns into less than 10% of the air transparency time amount of a honeycomb structure object, although it falls, since collection efficiency falls to less than 90%, pressure loss has the problem that uptake of the particle in exhaust gas cannot fully be carried out.

[0028] It turns out that 10 - 70% of porosity of ****** member No.4-10 of the air transparency time amount of a honeycomb structure object has air transparency time amount in 110 - 140% of range of the porosity of a honeycomb structure object from Table 2. Even if it changes average pore size, it becomes impossible for back wash air to almost pass a ****** member, if porosity becomes less than 110%. Moreover, if porosity exceeds 140%, although it falls, since collection efficiency becomes less than 90%, pressure loss cannot fully carry out uptake of the particle in exhaust gas.

[0029] Next, the depth of a ****** member is changed by ****** member No.2 shown in Table 2, and 4 and 10, an exhaust gas filter is created, and the result of having investigated the condition of collection efficiency, pressure loss, and the ****** member after an experiment is shown in Table 4.

[0030]

[Table 4]

項目	目封じ部材No.	目封じ部材深さ		補集効率(%)	圧力損失(mmH_2O)	目封じ部材状態	判定
		(mm)	対隔壁比(倍)				
実施例 8	4	25	58.1	95.5	1000	◎	良
実施例 9	4	13	30.2	95.0	950	◎	良
実施例10	4	12	28.0	95.0	950	○	良
実施例11	4	5	11.6	94.0	900	○	良
実施例12	10	25	58.1	92.0	650	◎	良
実施例13	10	13	30.2	91.5	550	◎	良
実施例14	10	12	28.0	91.5	550	○	良
実施例15	10	5	11.6	90.5	500	○	良
比較例 5	2	25	58.1	97.0	1200	◎	否
比較例 6	2	13	30.2	96.0	1200	◎	否
比較例 7	2	12	28.0	96.0	1200	○	否
比較例 8	2	5	11.6	95.5	1150	○	否
比較例 9	2	3	7.0	95.0	1150	×	否
比較例10	4	27	62.8	96.0	1050	◎	否
比較例11	4	3	7.0	93.0	900	×	否
比較例12	10	3	7.0	89.5	500	×	否

[0031] The ratio for a septum is expressed with a degree type in Table 4.
eye ratio for septum = -- the judgment of the quality as the **** depth / a septum thickness exhaust gas filter -- 90% or more of collection efficiency, and pressure loss 1000mmH2O Hereafter, the condition of the ****** member after an experiment made O or O good, and made except [this] no. The very good condition that the condition of a ****** member does not have dispersion in the depth of O:****** member here, O: It is expressed according to a good condition and the condition that a part of x:****** member has a deficit.
[0032] The exhaust gas filter formed in within the limits whose depth of a ****** member is 10 to 60 times the thickness of the septum of a honeycomb structure object as shown in Table 4 is 90% or more of collection efficiency, and pressure loss 1000mmH2O. It turns out hereafter that the condition of a ****** member is the good exhaust gas filter of O or O. Moreover, the depth of a ****** member does not have dispersion within the limits of 30 to 60 times of the thickness of the septum of a honeycomb structure object in the depth of a ****** member, and it turns out also from a viewpoint of mechanical strength that it is very good. Even if it stores the ****** member depth within the limits of ten to 60 times of the thickness of the septum of a honeycomb structure object in the example 5 of a comparison using the ****** member to which air transparency time amount exceeds 70% of the air transparency time amount of a honeycomb structure object - the example 8 of a comparison, pressure loss is 1000mmH(s)2O. It does not become below. Moreover, if the depth of a ****** member exceeds 60 times of the thickness of the septum of a honeycomb structure object, pressure loss will go up, and when the depth of a ****** member becomes less than 10 times of the thickness of the septum of a honeycomb structure object, it turns out that the mechanical strength of a ****** member falls remarkably.
[0033] Although collection efficiency was high and only ******** by the side of back wash air jet of the exhaust gas downstream was formed with the low ingredient of pressure loss in the example of this invention explained above, it is possible to also form ******** of the exhaust gas upstream with the same ingredient in this invention.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the typical sectional view showing one example of the exhaust gas filter of this invention.
[Drawing 2] It is the mimetic diagram showing one example of the offgas treatment equipment of this invention.
[Drawing 3] III of drawing 2 It is a direction view Fig.
[Drawing 4] It is the mimetic diagram showing the measuring device which performed air permeability method measurement by making the exhaust gas filter of this invention into a sample.
[Drawing 5] It is the typical enlarged drawing showing the sample cylinder of the air permeability method measuring device of drawing 4 .
[Description of Notations]
10 Offgas Treatment Equipment
12 Exhaust Gas Filter
15 Uptake Tank (Processor)
20 Septum
21 the -- 1 ****** (the 1st Stopping Section)
22 the -- 1 ****** (the 2nd Stopping Section)

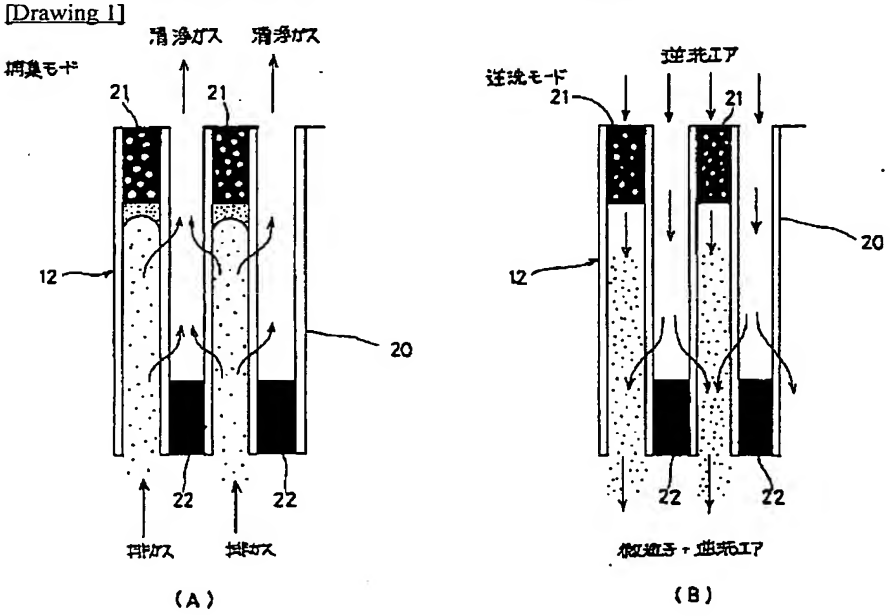
[Translation done.]

* NOTICES *

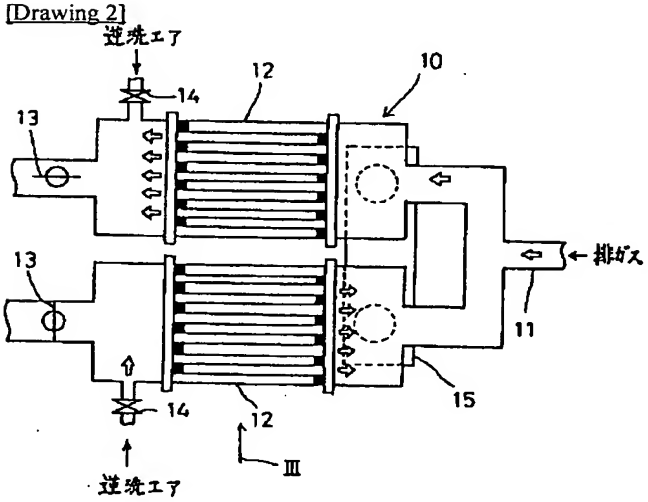
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

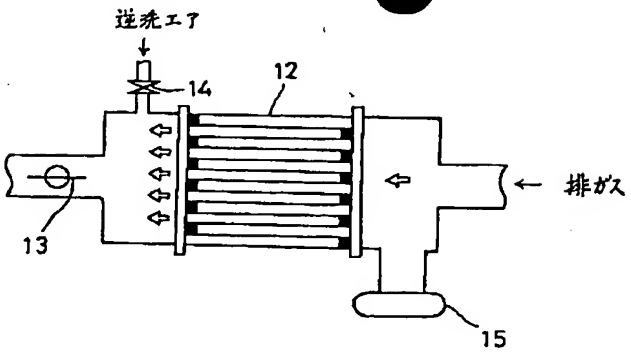
[Drawing 1]



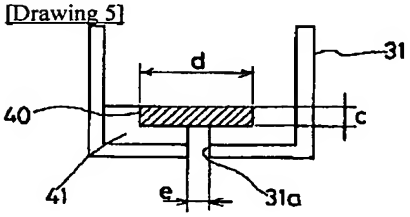
[Drawing 2]



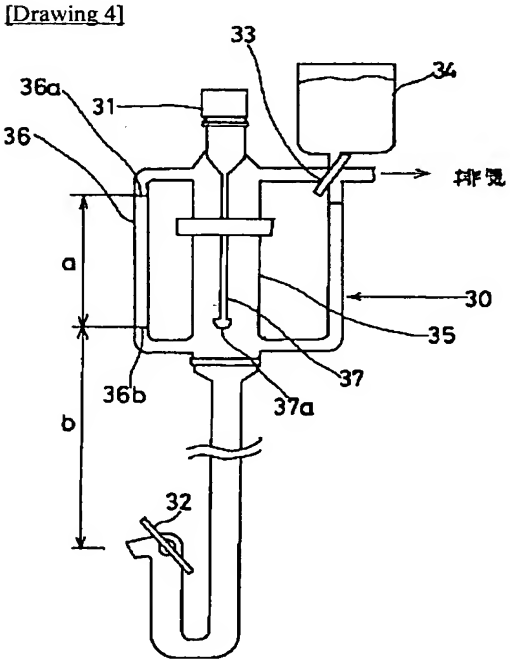
[Drawing 3]



[Drawing 5]



[Drawing 4]



[Translation done.]